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(54) Title: PROCEDURE AND COMPOSITION OF TREATMENT AND/OR CARE OF THE EYE

(57) Abstract: The invention provides a procedure for the manufacture of contact lenses for eye treatment, eye protection and eye-care wherein the lenses are impregnated with a suitable composition. The invention also provides a composition for the impregnation of a contact lens for the treatment and/or care and/or protection of the eye, a kit containing such a composition and one or more contact lenses. The invention further provides a method for the treatment and/or care and/or protection of the eye comprising wearing contact lenses impregnated with a suitable composition and a composition for disinfection and/or conservation of eye care products.

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Procedure and Composition of Treatment and/or Care of the Eye

The current invention provides a procedure for the manufacture of contact lenses for eye treatment, eye protection and/or eye-care. The invention also provides a composition for the impregnation of a contact lens for
5 the treatment and/or care and/or protection of the eye, a kit containing such a composition and one or more contact lenses as well as contact lenses impregnated with the composition.

Because they regularly have unusual objects in
10 their eyes for years contact lens wearers have a higher chance of damaging their cornea, eye-stratum, the endothelium or other parts of the eyes than non-wearers, for example because chemical substances which (may) cause irritation or damage to the eye could be released from
15 the lens or the surface of the lens after inserting the lens into the eyes. Lenses which have not been properly cleaned or damaged lenses as well as dust-particles, traces of sand or pollen which have gotten under the lens could also affect the cornea. These damages or irritati-
20 ons can be superficial and temporary, but could also result in far-reaching consequences since lenses are usually worn daily. Health risks could occur, varying from irritated and red eyes to serious complications such as permanent damage of the cornea resulting in blindness.

25 The cause of such complications is multifarious. Placing the contact lens onto the eye disturbs its physiological condition. After habituation a new balance will be reached that can be disturbed again by various factors, such as ageing of the contact lens, damage to
30 and deposit on the lens, change of tear-flow with respect to composition and quantity due to frequency and manner of winking, chemical toxicity of substances the user is in contact with, mechanical pressure and chronic lack of oxygen. The ageing of the user may bring about changes in

his or her eyes thereby disturbing the physiological balance. The use of medication or the development of allergies may also lead to irritations or damage of (parts of) the eyes.

5 Because nowadays contact lenses are frequently used for longer periods of time careful and regular cleaning has become more important. If this is not done sufficiently for instance bacteria, proteins etc. may cause irritations and damage (more promptly). To prevent
10 permanent damage it is vital that possible damage to the cornea or other parts of the eyes is treated as soon as possible.

 Moreover, contact lens wearers may need to extra protect their eyes. It could be useful to the eyes
15 to dispose of extra nutrition, such as vitamins and provitamins or (also) those substances which offer protection or allow, support or accelerate the repair of an occurring damage. In eye healthcare several products are known to assist in the (accelerated) recovery of the
20 soundness of the cornea. These products, however, usually have to be administered (dripped in or applied onto the eye) separately or have to be swallowed by the user.

 It is the aim of the current invention to provide the opportunity for a long-term care or treatment
25 and/or protection and/or care of the eyes.

 Considering the possibilities of irritation and damage to the cornea, the stratum, the endothelium or other parts of the eyes are manifold, one requires protection, conditioning and ,whenever possible, restoration
30 of the sustained damage to the eye. The current invention therefore provides a method for the manufacture of contact lenses for the treatment and/or care and/or protection of the eyes, comprising the impregnation of contact lenses in a solution which contains suitable compounds
35 for the treatment and/or care and/or protection of the eyes. By wearing contact lenses the compounds which treat and/or protect and/or care of the eyes will be in contact with (part of) the eyes. This way the lens will be a

method of administering these compounds which will often imply a more long-lasting administering compared to current eye-drops. The compounds mentioned can be either absorbed into the lens material or be attached to them or both. The term 'impregnate' in this application refers to either of these or to a combination of both.

Furthermore the current invention provides a composition for the impregnation of contact lenses for the treatment and/or care and/or protection of the eyes, comprising compounds suitable for eye treatment or care or protection.

The current invention offers various types of compounds dependent on the type of treatment, care or protection required. For the benefit of the user these compositions can be combined with the compounds usually used for disinfecting, cleaning, insertion, moisturizing, rinsing or storing of contact lenses, so that the user need not add these compounds separately. However, it is likewise possible to just impregnate the lenses with the above-mentioned care or treatment products to prevent damage caused by (other) cleaning-agents or disinfectants.

Compounds that can be applied, but are not limited to substances which feed or treat the eye or may improve, accelerate or initiate local damage repair, or (helps to) avoid local damage or irritations of (parts of) the eye, are: for instance (dex)pantenol, pantothenic acid, hyaluron acid, retinol (Vitamin A) and retinyl derivatives, carotene, thiamine (Vitamin B1), riboflavine (Vitamin B2), pyridoxine (Vitamin B6), nicotinic acid, nicotine acidamin, biotine (Vitamin B7), niacinamide and niacine (vitamin B3), ascorbic acid (Vitamin C) and other anti-oxidants, saccharose, honey and other bee products, red beetroot syrup, collagen, gelatin, taurin, serine protease and other enzymes, propamidines, Vitamine D and its derivatives such as calciferol, Vitamin K, tannin, pyruates, fibroplastin, fibronectine and fibrohydrolysate, heparin, alfa-ketaglutarine acid, carnisin, lamini-

sin, mucin, tenascin, peptides ,EGF, PDGF, FGF and all ophtalmologically acceptable salts and derivatives of the compounds mentioned above, selenium, calcium, zinc and other minerals.

5 Products used for maintenance and storage of contact lenses, like cleaning products and disinfecting solutions, and sprays, so-called all-in-one solutions, storage liquids and rinsing liquids, insertion solutions and moisturizers, neutralizers in either liquid or tablet
10 form, gels, coatings and tablets which either make or assist in making contact lens solutions or make solutions come into being or are used for or in such solutions.

 According to the current invention the composition can therefore appear in various forms, such as a
15 solution, spray or tablet which after dissolution makes a solution. Compounds intended for the care of contact lenses may also be part of a tablet which is combined with a solution that contains the care, treatment or protection agent or the reverse. Obviously both could
20 also be included in one tablet or in separate tablets. Even so compounds can be included in a solution that is (to be) mixed with a solution without a compound.

 Since the current substances which necessarily have to be applied for their germicidal and preservative
25 effects in eye-care solutions, eye-drops and contact lens care solutions and which are germicidal in a short period of time and sufficiently limiting increase in germ population usually have the disadvantage of causing irritation or even attacking the eye to a large or lesser degree
30 it would be greatly advantageous to use compounds in eye-care solutions, eye-drops and contact lens solutions for germicidal or conservation purposes which are non-irritant or protect against these irritations or damages. Possible damage and irritation of the cornea or other
35 parts of the eye will thus be avoided. An additional aim of the current invention is to disclose a method for improvement of the way a desired (and often necessary) antibacterial effect of a composition for contact lens

care or eye-care/eye-drops can be reached. A number of peptides are naturally found in the eye. They have a protective effect on the eye and particularly the cornea. The use of peptides in a composition for use in a contact lens solution, but also in eye-drops, could be greatly advantageous, because many peptides do not cause damage to the cornea; to some extent they also offer protection. They also offer protection from and support against bacterial infections, especially for people prone to such infections or people whose corneas are (easily) damaged.

According to the current invention peptides can be used separately or in combination with other eye-care products or treatments.

The composition according to the current invention can be applied when impregnating all kinds of contact lenses, especially and preferably soft lenses, but also hard lenses, disposable lenses and long-lasting ones as well as extended wear lenses and intra-ocular lenses would benefit. Impregnation can be carried out by the user, for instance during maintenance, but also, as with new lenses, in the delivery packaging.

It is not necessary for the user using the contact lenses according to the current invention to be already familiar with wearing lenses. People, and even animals, who in fact do not need any eye-correction, but who require for instance certain nutrients for the eye or products to (possibly) set off, support or accelerate healing sores or injuries could wear contact lenses or similar objects according to the current invention on or in the eye to facilitate the required compound(s) on or into the eye. It is not necessary for the active component with which contact lenses have been impregnated to repair or prevent any damage. Also medicines can be administered through a contact lens according to the current invention. An example of another type of effective compound, in this case a medicine, which could be administered advantageously to the eye according to the current invention is for instance cromoglycate. This

compound works as a precautionary protection against allergies. A contact lens with this compound could be used when the user expects an allergic reaction, for example in a period with high levels of pollen. Other
5 compounds can be used as well to either prevent or reduce allergic reactions, such as emedastine, azelastine and nedocromil.

Other applications of contact lenses according to the current invention could be found in the treatment
10 of so-called 'dry eyes' or irritated or red eyes, hence called 'dry eyes'. Currently mainly eye-drops are used to treat this. Such eye-drops, however, usually offer only short-term relief. In order to lengthen the availability of the active agents for the treatment of the eyes sever-
15 al complex or expensive possibilities for slow-release eye-drops have been proposed. The contact lenses according to the current invention offer a simple, cheap and elegant alternative.

It could be particularly advantageous to use
20 the compounds suggested in the current invention as giving relief to dry eyes in combination with polymers from which is known or believed that they, when used in eye-drops, offer relief, such as polymers of the type PVP, PVA, HPMC, HPC, Carbomere or Dextrane.

25 As mentioned above contact lenses according to the current invention can also be used to apply substances which cure or correct eye-diseases or disorders and which should be administered once or several times a day to take sufficient effect at least part of the day. The
30 use of contact lenses according to the current invention could be effective here. Moreover, the use of contact lenses will generally result in a more constant level of the effective agent at the point of application than would have been possible with the use of eye-drops or
35 even eye-balm. Eye-balm also has the disadvantages of causing limited eyesight directly after application and a less easy way of application for some users compared to applying contact lenses. For wearers of contact lenses

the use of the current invention with their own lenses is particularly economical, because they do not need to perform any supplementary actions.

An advantage of the current invention is that the price of contact lenses has dropped considerably over the last few years especially that of short-term use lenses such as the so-called day-lenses, week-lenses, month-lenses or three-months'-lenses. Such lenses are a preferable embodiment of the current invention.

The current invention will be illustrated in the following examples:

EXAMPLES

Examples of compositions to be used in the procedure according to the current invention are the following:

A. All-in-one solutions:

1. PHMB HCl 2.5 ppm
2. Boric Acid 0.75%
3. Borax 0.15%
4. NaCl 0.40%
5. EDTA-Na 0.03%
6. HPMC 10,000 0.10%
7. Dexpantenol 1.0%
8. pH adaptation with NaOH or HCl ad pH 7.4

B. Neutralizers (tablets):

1. Catalase 3000 IU
2. KH₂PO₄ 50 mg
3. K₂HPO₄ 150 mg
4. NaCl q.s.
5. Na-EDTA 0.2 mg
6. Collagene 5 mg
7. PVP K 90 10 mg

C. Storage solutions and insertion solutions:

1. HPMC 4000 cP 0.2 %
2. Citric Acid 0.5 %
- 5 3. Na citrate 1.0 %
4. NaCl ad 300 mOsm
5. Na-EDTA 0.02 %
6. Alexidine 2 HCL 0.5 ppm
7. Hyaluronic Acid 0.25 %
- 10 8. pH adaptation with NaOH or HCL ad pH 7.2

Claims

1. Method for the production of contact lenses for the treatment and/or care and/or protection of the eye, comprising the impregnation of contact lenses in a solution which contains suitable components for the
5 treatment and/or care and/or protection of the eye.

2. Composition for the impregnation of a contact lens for the treatment and/or care and/or protection of the eye, comprising one or more suitable components for eye-treatment and/or care and/or protection of the
10 eye.

3. Composition of claim 2. characterized in that for the treatment and/or care and/or protection of the eye at least one suitable component is selected from the group of: (dex)pantenol, pantothenic acid, hyaluron
15 acid and its salts and derivatives, retinol (Vitamin A) and retinol derivatives, carotenes, thiamines (Vitamin B1), riboflavine (Vitamin B2) pyridoxine (Vitamin B6), nicotinic acid, nicotinic acidamide, biotin (Vitamin B7), niacinamide and niacine (Vitamin B3), ascorbin acid
20 (Vitamin C) and other anti-oxidants, saccharose, honey and other bee products, red beetroot syrup, collagen, gelatine, taurine, serine protease and other enzymes, propamidines, Vitamin D and its derivatives such as calciferol, Vitamin K, tannin, pyruvates, fibroplastine,
25 fibronectin, fibronectinhydrolysate, heparin, alfa-ketoglutaric acid, carnisine, laminisine, mucin, tenascin, peptides, EGF, PDGF, FGF, sugaresters and all pharmaceutically acceptable salts and derivatives of the compounds mentioned above, as well as selenium, calcium, zinc and
30 other minerals.

4. Composition of claims 2 or 3 further containing compounds to disinfect, clean, insert and/or store contact lenses.

5. Composition of claim 4 characterized in that it contains one or more peptides as component to disinfect, protect, clean and/or store the contact lenses.

6. Composition of claims 2-5 characterized in that the suitable component for eye-treatment is a medicine.

7. Composition according to claim 6 characterized in that the medicine is chosen from the group of cromoglycin acid, Edamastine, azelastine and nedrocromil and their ophtalmologically acceptable salts and derivatives.

8. Composition of claims 2-7 characterized in that the composition takes the form of a spray, solution, gel, coating and/or tablet.

9. Contact lens for treatment and/or care and/or protection of the eye impregnated with a composition of claims 2-8.

10. A kit for the production of contact lenses for the treatment and/or care of the eye, comprising one or more kits of contact lenses and the composition of claims 2-8.

11. Method for the treatment and/or care and/or protection of the eye comprising the wearing of the contact lenses according to claim 9 for a set period of time.

12. Method of claims 11 for the treatment or prevention of dry eyes.

13. Method of claim 11 for the treatment or prevention of allergic symptoms.

14. Method of claim 11 for the treatment of eye-diseases.

15. Composition for disinfection and/or conservation of contact lenses or eye-care products or eye-drops characterized in that they contain at least one peptide and or a sugarester.

INTERNATIONAL SEARCH REPORT

PCT/NL 02/00012

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A61L12/08 A61F9/00 A61K9/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A61L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DATABASE WPI Week 198837 Derwent Publications Ltd., London, GB; AN 1988-262735 XP002195280 & SU 1 377 104 A (KBME-R KUIB MED INST), 29 February 1988 (1988-02-29) abstract ---	1
X	DATABASE WPI Week 199649 Derwent Publications Ltd., London, GB; AN 1996-495831 XP002195281 & RU 2 055 555 C (MARG-I MARGUS M E), 10 March 1996 (1996-03-10) abstract --- -/--	1

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the International filing date

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

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Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT

PCT/NL 02/00012

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 24 26 757 A (GUENTHER NORBERT ARMIN) 11 December 1975 (1975-12-11) page 2, paragraphs 2,3 page 5, paragraph 3 -----	1

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

PCT/NL 02/00012

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International Application No. PCT/NL 02/00012

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claim : 1

Method for the production of contact lenses

2. Claims: 2-8

Composition for the impregnation of a contact lens

3. Claim : 9

Contact lens for treatment and/or care and/or protection of the eye

4. Claim : 10

Kit for the production of contact lenses

5. Claims: 11-14

Method for the treatment and/or care and/or protection of the eye

6. Claim : 15

Composition for disinfection and/or conservation of contact lenses

INTERNATIONAL SEARCH REPORT

PCT/NL 02/00012

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
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